

**Remarks/Arguments:**

Claims 1-6, 8, 9, 11, and 14-16 are pending in the application. Claim 1 is currently amended. Support for the amendment may be found, for example, at page 1, lines 24 and 25 of the specification. Accordingly, no new matter has been added.

Applicants thank the Examiner for recognizing the allowable subject matter of claims 3 and 6, and for the courtesy extended during the Examiner Interview on September 25, 2008. During that interview, applicants' representatives proposed the amendment to claim 1 now made. To reiterate, neither Ayers nor Nivens discloses, even as combined, using an ion exchange resin containing primary or secondary amino groups to form a sulphided ion exchange resin by passing through the resin a liquid hydrocarbon feedstock containing elemental sulphur dissolved therein.

**Rejections under 35 U.S.C. §103**

Claims 1, 4, 5, and 8 stand rejected as unpatentable over U.S. Patent No. 2,592,523 ("Ayers") in view of U.S. Patent No. 4,011,882 ("Nivens"). Claim 2 stands rejected as unpatentable over Ayers and Nivens and further in view of EP 0 319 615 ("Duisters") and U.S. Patent No. 6,221,241 ("Carnell"). Claims 9, 11, and 14-16 stand rejected as unpatentable over Ayers and Nivens and further in view of Duisters. Applicants traverse these rejections and submit that the currently pending claims are patentable over these cited references for at least the reasons set forth below, namely, the references, alone or in any reasonable combination, do not teach each of the claimed limitations.

"To establish a *prima facie* case of obviousness, ... the prior art reference (or references when combined) must teach or suggest all the claim limitations." M.P.E.P. §2143. Additionally, as set forth by the Supreme Court in KSR Int'l Co. v. Teleflex, Inc., 82 U.S.P.Q.2d 1385 (2007), it is necessary to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the prior art elements in the manner claimed.

**Rejection of Claims 1, 4, 5, and 8**

Claim 1, as currently amended, recites "a method of making a sulphided ion exchange resin containing primary or secondary amino groups and the concomitant removal of elemental sulphur from a liquid hydrocarbon feedstock comprising **passing said feedstock containing**

**elemental sulphur dissolved therein through a bed of an ion exchange resin containing primary or secondary amino groups, thereby forming a sulphided ion exchange resin containing primary or secondary amino groups."**

Applicants maintain Ayers and Nivens, alone or in combination, do not arrive at the invention as claimed in claim 1. Ayers relates to using a resin which has been modified by reaction with an organic alkanol-amine or other organic nitrogen compounds to remove mercaptans and hydrogen sulphide from gas mixtures, petroleum fractions and the like. See col. 2, lines 12-25 of Ayers. Thus, Ayers is directed to a solid amine-modified resin, but does not teach the removal of elemental sulphur dissolved in a liquid hydrocarbon feedstock using an ion exchange resin as claimed.

On the other hand, Nivens is directed toward using a hydrocarbon liquid wash containing soluble amine compounds to remove sulphur that has become fixed by complex formation to the interior walls of a pipeline. Nivens uses amines in a sweet fluid to complex with deposited sulphur compounds and *solubilize* them. In contrast, in the claimed invention, elemental sulphur dissolved in a hydrocarbon feedstock is *trapped* on a bed of an ion exchange resin containing primary or secondary amines. Thus, the disclosure in Nivens of solubilizing the sulphur compounds deposited on the interior walls of a pipeline is directly contradictory to forming a sulphided ion exchange resin in which elemental sulphur has been essentially "insolubilized."

Furthermore, while Nivens describes sour hydrocarbon fluids (crude oils, sour distillates, sour condensates) which contain substantial amounts of sulfur including elemental sulfur, a person of ordinary skill in the art would understand the reaction taught in Nivens is between the sweet fluid and the sulphur compounds produced by the reaction of a corrosion inhibitor present in the sour hydrocarbon fluid with the sulphur and sulphur compounds to form a protective film on the interior pipeline surfaces. Col. 4, lines 13-23 of Nivens. Subsequently, a sweet hydrocarbon liquid wash solution containing the amines is then used to solubilize and remove the sulphur compounds from the interior pipeline surfaces. Col. 4, line 26 through col. 5, line 15.

Thus, even in combining Ayers and Nivens, the references do not teach passing a feedstock containing elemental sulphur **dissolved therein** through a bed of an ion exchange resin containing primary or secondary amino groups, thereby forming a sulphided ion exchange

resin. Accordingly, combining Ayers and Nivens would not arrive at the features of the claimed invention, and it would not make sense to one skilled in the art to combine them.

Because a *prima facie* case of obviousness has not been shown, it is respectfully submitted that independent claim 1 is in condition for allowance. Claims 2, 4, 5, 8, 9, 11, and 14-16 depend from claim 1 and therefore should each be allowed for at least the reasons set forth above.

### **Rejection of Claim 2**

Claim 2 is patentable for at least the reasons discussed above. Claim 2 further recites "the liquid hydrocarbon feedstock is passed through a **bed of a hydrogen sulphide absorbent after** passage through the bed of **the ion exchange resin.**" Ayers and Nivens do not teach passing a hydrocarbon feedstock through a bed of a hydrogen sulphide absorbent after passing through the ion exchange resin. Ayers teaches a single step of removing hydrogen sulfide with a modified resin. See Ayers col. 2, lines 26-43. There is no reference to a distinct and separate bed of hydrogen sulphide absorbent, e.g., no secondary step is disclosed. Further, if the hydrogen sulfide was removed with the resin as described in Ayers, it would not make sense to have a second step of hydrogen sulphide absorbent. Nivens clearly does not disclose this feature. Duisters is directed toward mercury removal using an ion exchange resin containing thiol groups. Applicants submit Duisters is completely inapplicable as claim 2 is directed to elemental sulphur removal and not mercury removal. Furthermore, there is no reason to motivate one skilled in the art to combine the references in this manner especially when Carnell does not even relate to ion exchange resins.

As none of the references, alone or in any reasonable combination, teaches each of the claimed limitations, Applicants respectfully submit a *prima facie* case of obviousness has not been established, and claim 2 should be in condition for allowance.

### **Rejection of Claims 9, 11, and 14-16**

Claims 9, 11, and 14-16 are patentable for at least the reasons discussed above. Further, claim 9 recites "said liquid hydrocarbon feedstock further comprises mercury or inorganic mercury compounds, and wherein **at least the inlet portion of the bed of an exchange resin is sulphided before a mercury containing stream is passed through the**

**bed, thereby to remove said mercury or organic mercury compounds** from said liquid hydrocarbon feedstock."

Neither the references alone nor in any reasonable combination teach the feature of at least the inlet portion of the bed of an exchange resin is sulphided before a mercury containing stream is passed through the bed. Duisters relates to removing mercury from hydrocarbon mixtures using a thiol-functional absorbent and may also contain sulphonic acid groups. The thiol functionality is meant to differentiate the materials from the known sulphided carbon and metals. See col. 1, lines 39-45 of Duisters. The absorbent resin of Duisters, however, does not comprise elemental sulphur and does not disclose a sulphided ion exchange resin. Because the limitations of claim 9 are not present in these references, a *prima facie* case of obviousness is not met, and claim 9 should be in condition for allowance. Claims 11 recites similar features of removing mercury using a sulphided ion exchange resin and should be in condition for allowance for at least the reasons set forth above. Claims 14-16 depend from claim 11 and are allowable as dependent thereon.

### **Conclusion**

For all of the foregoing reasons, Applicants respectfully request reconsideration and allowance of the claims. Applicants invite the examiner to contact their undersigned representative if it appears that this may expedite examination.

Respectfully submitted,



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Christopher R. Lewis, Reg. No. 36,201  
Attorney for Applicants

CRL/CEB/lrb

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P.O. Box 980  
Valley Forge, PA 19482-0980  
(610) 407-0700

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